MRR-2 profiling radar data (Chazy, NY) – raw [UAlbany, NYSM]

Authors:

Justin R. Minder (lead author, corresponding author)
Associate Professor
Department of Atmospheric and Environmental Sciences
University at Albany
ETEC 496
1400 Washington Avenue
Albany, NY 12222
jminder@albany.edu
518-437-3732
ORCID: 0000-0001-7182-7898

Nathan Bain
New York State Mesonet
University at Albany
Albany, NY
nbain@albany.edu

W. Massey Bartolini
Department of Atmospheric and Environmental Sciences
University at Albany
Albany, NY
mbartolini@albany.edu

Karl Hemker Jr.
New York State Mesonet
University at Albany
Albany, NY
khemker@albany.edu

Scott McKim

New York State Mesonet
University at Albany
Albany, NY
smckim@albany.edu

1. **Data Set Description**

1.1. **Introduction:** This dataset contains raw data from a METEK vertically profiling K-band Micro Rain Radar (MRR-2) deployed at Chazy, New York in support of the WINTRE-MIX field campaign (https://www.eol.ucar.edu/field_projects/wintre-mix). The instrument provides vertical profiles of reflectivity, Doppler velocity, and spectrum width. The site sits in the northern end of the Lake Champlain Valley. Several other sites also collected MRR data during WINTRE-MIX. Data from these other sites will also be made available in the WINTRE-MIX data archive (https://data.eol.ucar.edu/master_lists/generated/wintre-mix/).

1.2. **Data version:** v1.0, 8 July 2022. DOI: https://doi.org/10.26023/SWRV-99Y4-VC0C

1.3. **Time period covered:** 7 January 2022 – 20 April 2022

1.4. **Location:**

- The MRR-2 was mounted on a tripod atop a roof (Fig. 1), co-located with a Parsivel disdrometer and the profiler instruments of the New York State Mesonet Chazy profiler station (PROF_CHAZ; http://nysmesonet.org/about/sites#network=profiler&stid=prof_chaz). The approximate location is shown in Fig. 2.
- Latitude: 44.889°
- Longitude: -73.46634°
- Elevation: 74.3 m MSL

1.5. **Data frequency:** 10 second

1.6. **Web address:** Preliminary MRR-2 data are visualized as “quick look” plots on the WINTRE-MIX field catalog (https://catalog.eol.ucar.edu/wintre-mix/114/date/).

1.7. **Dataset restrictions:** Please refer to the WINTRE-MIX data policy (https://www.eol.ucar.edu/content/wintre-mixdata-policy) as well as the WINTRE-MIX data management plan

(https://www.eol.ucar.edu/system/files/Data_Management_Plan-1Dec2021.pdf) for more information regarding dataset restrictions and dissemination.

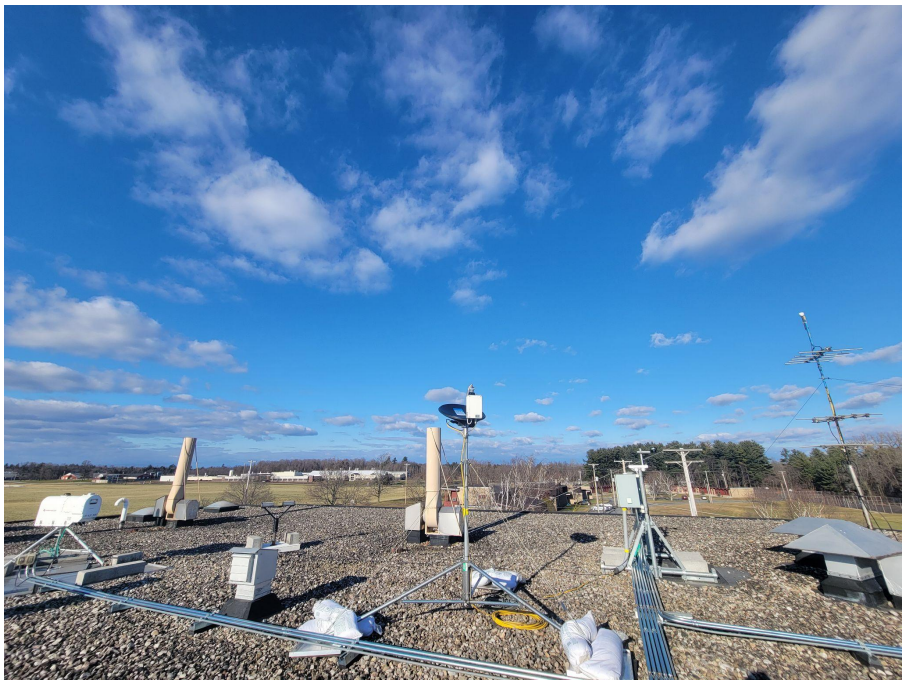

Fig. 1. Photos of the Chazy MRR-2, taken at the time of deployment showing mounting and nearby surroundings.

Fig. 2. Approximate location of Chazy, NY MRR-2 radar deployment (CHAZ).

2. Instrument Description

A METEK K-band FM-CW Micro Rain Radar-2 (MRR-2,http://metek.de/product/mrr-2/) was deployed at CHAZ (Fig. 1). The attributes of the MRRs are summarized in Table 1. More detailed technical information on the MRR2 is available in METEK (2015, 2021).

Table 1: Technical specifications and configuration settings for the MRR-2

Parameter	**Value**
Transmit power	50 mW
Frequency	24 GHz

Number of range gates	32
Antenna heating	230 VAC / 24 VDC, 25 W
Beam width	2 degrees
Range resolution used	200 m
Raw data collection frequency	10 s

3. Data Collection and Processing

The MRR-2 was configured to collect data every 10 seconds with a 200-m range gate spacing (Table 1). Antenna heating was used to prevent accumulation of snow and ice on the dish. MRR-2 raw data (.raw files) was logged onto a Windows PC using the METEK MRR Control Software as described in METEK (2021) and grouped into daily files. A post-processed version of the data is available in a companion dataset: *MRR-2 profiling radar data (Chazy, NY) – post-processed [UAlbany, NYSM]*

4. Data format

Files are daily, containing 24 hours of data, and are named with the following format:
WINTRE-MIX_MRR2_CHAZ_YYYYMMDD.raw
where *CHAZ* represents the site identifier and *YYYYMMDD* is the date of data collection in UTC.

Data is stored as ASCII text according to the METEK *raw spectra* format. As described in METEK (2021), each sample is recorded as a data block.

The first line of each data block contains the following fields:

- Identifier for MRR data
- date/time stamp in format: YYMMDDhhmmss UTC
- Device version/firmware number (DVS)
- Device serial number (DSN)
- Bandwidth (BW)
- Calibration constant (CC)

- Micro Rain Radar Data (MDQ) quality: (percentage of valid spectra, number of valid spectra and number of total spectra)
- Identifier for data type (RAW)

According to METEK (2021):

"The next data lines contains the measuring heights. It begins with the capital letter H (H means height) and two space characters. The following numbers (9 digits decimal each) represent the measuring heights in meters.

The height line is followed by the line of the transfer function. It starts with the capital characters TF (Transfer Function) and one space character. The rest of that line represents the values of the transfer function for each height step (9 digits decimal each).

The line of the transfer function is followed by 64 data lines. Each one starts with the capital character F and a 2-digit number of the spectra line (0 to 63). The rest of these lines represent the received spectral signal power in engineering units for each height step (9 digits decimal each).

The raw spectra include the receiver noise floor."

5. Data Remarks

No major data artifacts were noticed in review of the data. Some spurious weak echos are occasionally found above 5 km MSL in the data, perhaps associated with local sources of microwave interference. Table 3 summarizes issues with missing data that affected specific days.

Table 3: Summary of missing data

Date (YYYY-MM-DD)	**Notes**
2022-02-16	Partial missing data (data logging PC down)
2022-02-17	Partial missing data (data logging PC down)
2022-03-16	Partial missing data (data logging PC down)
2022-03-17 – 2022-03-20	Missing data (data logging PC down)

2022-03-21	Partial missing data (data logging PC down)
2022-04-20	Partial missing data (data logging PC down)

5. References

*METEK, 2021: MRR-2 Micro Rain RADAR User Manual. *METEK GmbH.*

*METEK, 2015: MRR Physical Basics. *METEK GmbH.*

* *Metek MRR manuals are provided as attachments.*

6. Appendix

Suggested GCMD keywords to accompany this dataset are provided below in no particular order:

- Solid precipitation
- Frozen precipitation
- Precipitation profiles
- Melting layer height
- Rain
- Freezing rain
- Drizzle
- Freezing drizzle
- Ice pellets
- Snow
- Ice storms
- Snow storms
- Extratropical cyclones
- Radar
- Doppler velocity
- Radar reflectivity
- Spectrum width